Volume 71 Article 7

1-1-1984

Computers in Forestry- A Modem Tool

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Computers in Forestry- A Modern Tool

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Foresters, like other professionals, are using computers more and more frequently in their daily decision-making routine. Modern computers are lighter, more powerful and offer more tailor-made means to solve forestry-related problems than they did only a few years ago. When Drs. Atanasoff and Berry invented the first electronic digital computer here at Iowa State University in 1939, they probably had no idea of the sweeping impact this tool would have on mankind. For sure, they did not envision "dirt foresters" or "timber beasts" using computers to process inventory data, or project the growth and development of mixed hardwood stands, or determine the cutting budget for a one million acre National Forest for the next ten years or more.

The purpose of this article is twofold. First, it will address the relationship between computers and modern forestry. Second, it will explore some of the many applications of computers to forestry research/administration, extension, and education.

The modern computer, whether a mainframe unit or a personal computer, is used to promote excellence now and into the future by acting as our collective eye, allowing us to see the forest as never seen before through computer interpreted and enhanced imagery. It is our modern slide-rule, allowing us to compute optimum production schedules of sawtimber, pulpwood and veneer logs for a large industrial forest company. Also, the computer is our modern notepad and spreadsheet helping us to create an environmental impact statement (EIS) for proposed wilderness designation of 30,000 acres on the Alleghany National Forest or produce a series of tables each depicting the impacts of increased labor costs on the total cost of a reforestation project in Nepal.

Computers permeate the fabric of forestry. They are tools used effectively and creatively in research, education, extension, and for personal purposes. Some people, including foresters, fear computers. Ogden Nash in "Wilderness and The American Mind" said that early man feared the forests because they were untamed, uncontrollable, and filled with beasts. But, as mankind advanced socially, politically, economically and intellectually, wilderness was thought of in an opposite and enlightened manner. Wilderness became in our mind's eye something sublime, beautiful and pristine.

We offer these words to provide an analogy. In this case, a concept or physical entity- the computer- first is seen in one manner (almost exclusively) as a tool to be feared, but over time, that same concept or physical entity is seen and used in an entirely different way. We submit that computers can be and are currently seen both as something to be feared and something of beauty. It may be hard to think of computers as objects of beauty, but to the forest manager who just ran a computer program that in seconds did what would have taken years of meticulous and boring calculations to do by hand, it is beautiful (or at least kind of cute). The real beauty is in allowing the forester to better use knowledge and understanding to aid in making decisions about complex and expensive forestry operations.

You may fear computers or know someone who does. We are sure that computers can be and are sometimes wrongly applied to solve forestry problems. This, however, is caused by a poor human choice, not the computer. The computer is a dumb, dedicated slave. It is a tool which speeds, enhances, extends and beautifies the forester's decision-making routine.

Using the computer should not cause foresters to forget or ignore the basic biologic/ecologic and economic principles used daily in solving forestry problems or planning forestry activities. Foresters must continue to respect and at times favor marshes, boggy areas, rocky snow covered peaks and mountain sheep. The point here is that foresters must simultaneously consider a multitude of resources, people demands and resource limitations. This is an extremely difficult and time consuming job. If we purposefully ignore or shun the use of any tool which can make us better foresters, then we give up part of our voice in the management of the forest resources.

Our professional strength in managing the vast forest lands for the future lies in our understanding of the complex interactions between mankind and this spaceship Earth. Aldo Leopold once said, "Education, I fear, is learning to see one thing by going blind to another." We, as foresters, simply cannot let this happen. We must

use our talents, creativity, and modern tools, like the computer, to become better managers of the forestlands and more attuned to peoples wants and needs.

Now let us consider the application of computers to forestry research/administration, extension, and education.

Large mainframe and mini-computers are used daily by research foresters throughout the world to help solve forestry problems. Vast quantities of information and data have to be input, filed, processed and printed rapidly to be of use in the scientific research process. Currently, the US Forest Service is assembling, what some have called, the second largest computer system in the world. This computer system will link the individual National Forest Districts with the Supervisors office, the Regional office, the Washington office, and the various research stations nation-wide. The Forest Level Information Processing System (FLIPS) is the new computer system that will provide the link between the scores of Ranger Districts in a Region, and among the Regions, nationwide.

Largely as a result of the Renewable Resources Planning Act (RPA) of 1974, each National Forest must develop a comprehensive forest management plan by 1985. Further, each Region must develop a coordinated and comprehensive regional forest management plan by the same time. These plans, once finished, will be implemented, revised and updated in accordance with RPA and the National Forest Management Act (NFMA) of 1976. This is a massive undertaking, unprecedented in the area of natural resources management. The Forest Service, in order to accomplish its assigned tasks, must rely on computers.

Researchers and administrators in the Forest Service will use many other computers and computer software to analyze, and summarize billions of pieces of information and data. The forest plans will be developed with the aid of FORPLAN, which stands for FORest PLANning. This system is built around a very large linear programming package. Other Forest Service computer software programs include; TAMM (Timber Assessment Market Model for North American markets for softwood lumber, plywood, and stumpage), Timber RAM (Timber Resource Allocation Model), TMIS (Timber Management Information System), and RIM (Recreation Information Management system).

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Like their public counterparts, Forest Industry uses large integrated computer systems. Perhaps the second oldest linear programing-based forest management planning model, and the most notable of the industrial systems is MAX-MILLION. It is probably safe to say that, without exception, all large private industrial forestry businesses use computers in their daily production and management operations and for long-run planning, budgeting, and control.

Nationwide, extension foresters are developing and adapting forestry software to micro-computers (also known as personal computers or PC's). Since one of the primary functions of extension foresters is technology transfer, it is appropriate for them to be actively involved in facilitating the marriage of modern forestry managment concepts and personal computers. Most of the clients helped by extension foresters are non-industrial private woodland owners. This client group, with its myriad of management objectives, financial resources, and highly variable knowledge of forestry, needs the opportunity to obtain competent professional forestry help. Personal computers allow for more information and technology to be transferred rapidly from the relatively few extension foresters to the millions of non-industrial private woodland owners. In the private sector, consulting foresters are advertising computer-based services like forest inventories, growth and yield modelling, mapping of forest types, and forest investment analyses.

All forestry schools have a few "weird" faculty members who actually like to work with and be aided by computers. Sometimes, however, while listening to them, you may hear "...that ##!?*& machine ate my ??**&%% data". But, many computer programs have been written and brought into the classroom or lab to generate sample data from an inventory, identify wood samples, provide forest management information for a freshman level management-role playing exercise, provide soil expectation values for alternative timber investment opportunities, or optimize present net worth of a 500,000 acre forest subject to timber, water, wildlife, soil, and budget constraints over a fifty year period. In all, the computer is being used to enhance learning of basic forestry principles, skills and decision-making. Further, the hands-on experience that students are obtaining in the classroom and lab will give them a necessary and competitive edge in the forestry profession.

Computers are an important and necessary modern tool used by foresters, young and old, to

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organization.

The Forest Service may not have all of the answers as to how to become an "Excellent" organization as described by Peters and Waterman. However, the top management of the Forest Service recognizes the need to communicate a clear vision of excellence to all Forest Service managers. A major challenge to the organization will be its ability to create a climate in which the seeds of excellence can grow to maturity. If one message clearly resonates from recent literature it is that we Americans have done well on instilling the harder management values of planning, control, and quantitative decision making in our managers, but have not always been able to merge these with the softer values of employee motivation, work spirit, organizational development, and human potential. When Forest Service managers can successfully bring all these components into concert, they will have succeeded in reaching their goal of true excellence.

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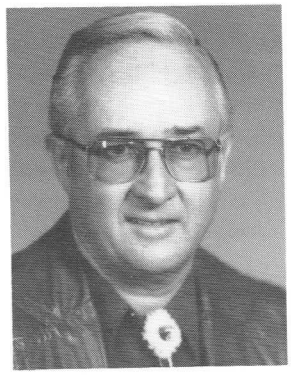

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help solve a myriad of complex forestry problems. These modern electronic wizards allow us to "see" the forest as never seen before. They allow us to extend the frontier of knowledge in remote sensing, inventory analysis, management/planning optimization, and growth and yield modelling of virgin or established forests. The abilities of massive data storage, retrieval, and analysis by computers helps foresters to better manage the tens of millions of forested acres around the World. We, as foresters, are stewards of valuable natural resources- land, soil, water, wildlife, and forests. As such, we need all the tools modern science can provide to help us become effective, knowledgeable, and creative foresters. One advertisement by a large industrial firm says "the future is now," and another says "we can't wait!" Another saying, one from forestry, is "We don't plant trees for this generation--- we plant them for the future generations." All of these sayings are true! We need to make the best decisions today for the benefit of the future generations. We need the ability to see the future, as clearly as possible, to aid in these complex decisions concerning forests and all natural resources. The modern computer is our eye to the future and our link with knowledge from the past. Just remember though: the computer may act as our eye, but not our brain. We are the decision-makers, not the computer.

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foresters will be glad that they did not compromise themselves by merely hoping for better times but took pride in their own pursuit of excellence.

Nowhere can I find a better nor older statement about the pursuit of excellence in the face of adversity than this one written around 700 BC by Hesoid. "Badness you can get easily, in quantity; the road is smooth, and it lies close by. But in front of excellence the immortal gods have put sweat, and long and steep is the way to it; and rough at first. But when you come to the top, then it is easy, even though it is hard." ■